

LISTING OF CLAIMS

1. (Original) An improved method for hydrotreating a distillate boiling range feedstream containing both nitrogen and sulfur contaminants and having a total acid number comprising:
 - a) providing a sulfuric acid solution having a sulfuric acid concentration of greater than about 75 wt.%, based on the sulfuric acid solution;
 - b) contacting a distillate boiling range feedstream containing both nitrogen and sulfur heteroatoms with the sulfuric acid solution under conditions effective at removing at least about 80 wt.% of the nitrogen compounds contained in said diesel boiling range feedstream thereby producing at least an effluent comprising at least a distillate boiling range product stream and a used sulfuric acid solution, wherein the volumetric treat rate of the sulfuric acid solution is greater than about 0.5 vol.%, based on the distillate boiling range feedstream; and
 - c) hydrotreating said distillate boiling range product.
2. (Original) The process according to claim 1 wherein the distillate boiling range feedstream boils in the range of about 300 to about 775°F.
3. (Currently Amended) The process according to ~~any preceding~~ claim 1 wherein the distillate boiling range feedstream boils in the range of about 400°F to about 700°F.
4. (Currently Amended) The process according to ~~any preceding~~ claim 1 wherein the distillate boiling range feedstream contains about 25-2500 wppm nitrogen.

5. (Currently Amended) The process according to ~~any preceding~~ claim 1 wherein the nitrogen present in said distillate boiling range feedstream includes carbazole and/or substituted carbazoles.

6. (Currently Amended) The process according to ~~any preceding~~ claim 3 wherein said sulfuric acid solution contains greater than about 80 wt.% sulfuric acid.

7. (Currently Amended) The process according to ~~any preceding~~ claim 2 wherein said sulfuric acid solution is obtained from an alkylation process unit.

8. (Currently Amended) The process according to ~~any preceding~~ claim 7 wherein said alkylation process comprises:

- a) combining an olefinic hydrocarbon feedstream containing C₄ olefins with isobutane to form a hydrocarbonaceous mixture; and
- b) contacting the hydrocarbonaceous mixture with sulfuric acid under conditions effective for producing at least an alkylate and a sulfuric acid solution having an acid concentration of at least about 75 wt.%.

9. (Currently Amended) The process according to ~~any preceding~~ claim 7 wherein a diluent is added to said sulfuric acid solution to adjust the sulfuric acid concentration of said sulfuric acid solution.

10. (Currently Amended) The process according to ~~any preceding~~ claim 1 wherein the sulfur concentration of the distillate boiling range product stream is about 0.1 to about 25 % wt.% less than the distillate boiling range feedstream.

11. (Currently Amended) The process according to ~~any preceding~~ claim 1 wherein the yield loss attributed to the sulfuric acid solution treatment is about 0.5 to about 6 wt.%.

12. (Currently Amended) The process according to ~~any preceding~~ claim 2 wherein the treat rate of the sulfuric acid solution is about 0.5 to about 20 vol.%

13. (Currently Amended) The process according to ~~any preceding~~ claim 12 wherein the nitrogen-containing distillate boiling range feedstream and the sulfuric acid solution are intimately contacted by a contacting method selected from non-dispersive and dispersive contacting methods.

14. (Currently Amended) The process according to ~~any preceding~~ claim 12 wherein the contacting method is selected from packed inert particle beds and fiber film contactors.

15. (Currently Amended) The process according to ~~any preceding~~ claim 14 wherein the dispersive contacting method is selected from mixing valves, static mixers and mixing tanks or vessels.

16. (Currently Amended) The process according to ~~any preceding~~ claim 1 wherein the distillate boiling range product stream and the used sulfuric acid solution are separated by any means known to be effective at separating an acid from a hydrocarbon stream.

17. (Currently Amended) The process according to ~~any preceding~~ claim 16 wherein the distillate boiling range product and the used sulfuric acid solution

are separated by a separation device selected from settling tanks or drums, coalescers, electrostatic precipitators, and other similar devices.

18. (Currently Amended) The process according to ~~any preceding~~ claim 17 wherein the distillate boiling range product and the used sulfuric acid solution are separated contacted by fiber film contactors.

19. (Currently Amended) The method according to ~~any preceding~~ claim 1 wherein the hydrotreating of the effluent is achieved by contacting said effluent with a hydrotreating catalysts containing at least one Group VI metal oxide and at least one Group VIII metal oxide under conditions effective at removing or converting at least a portion of the sulfur contained in said distillate boiling range product.

20. (Currently Amended) The method according to ~~any preceding~~ claim 16 wherein said improved method further comprises contacting said distillate boiling range product stream with an effective amount of an acid reducing material selected from caustic and water under conditions effective at reducing the total acid number of said distillate boiling range product prior to hydrotreating.

21. (Currently Amended) The process according to ~~any preceding~~ claim 1 wherein the distillate stream is a non-hydrotreated distillate or a blend of non-hydrotreated distillates.

22. (Currently Amended) The process according to ~~any preceding~~ claim 21 wherein the sulfuric acid solution has an acid concentration of greater than about 76 wt.%, a water concentration of about 2 wt.% to about 12 wt.%, and a dissolved oil concentration of less than about 12 wt.%.

23. (Currently Amended) The process according to ~~any preceding~~ claim 1 wherein the distillate stream is a hydrotreated distillate, or a blend of hydrotreated distillates, each of which may or may not contain cracked stock.

24. (Currently Amended) The process according to ~~any preceding~~ claim 23 wherein the sulfuric acid solution has an acid concentration of greater than about 79 wt.%, a water concentration of about 2 wt.% to about 9 wt.%, and a dissolved oil concentration of less than about 12 wt.%.

25. (Currently Amended) The process according to ~~any preceding~~ claim 1 wherein the distillate stream is a non-hydrotreated distillate or a blend of hydrotreated distillates, containing greater than 10% cracked stock, based on the distillate or blend.

26. (Currently Amended) The process according to ~~any preceding~~ claim 25 wherein the sulfuric acid solution has an acid concentration of greater than about 79 wt.%, a water concentration of about 2 wt.% to about 9 wt.%, and a dissolved oil concentration of less than about 12 wt.%.

27. (Currently Amended) The method according to ~~any preceding~~ claim 1 wherein the distillate boiling range feedstream contains greater than 40 wt.% cracked stock.

28. (Currently Amended) The process according to ~~any preceding~~ claim 27 wherein the sulfuric acid solution treat rate is about 3 vol.% to about 6 vol.% based on the distillate boiling range feedstream.

29. (Original) An improved hydrotreating process for distillate boiling range feedstreams boiling in the range of about 300 to about 775°F and containing about 50 to about 2500 wppm nitrogen and about 40 wppm to about 35000 wppm sulfur contaminants and having a total acid number comprising:

- a) providing a sulfuric acid solution having a sulfuric acid concentration of greater than about 75 wt.%, based on the sulfuric acid solution;
- b) contacting the distillate boiling range feedstream containing both nitrogen and sulfur heteroatoms and having a total acid number with the sulfuric acid solution under conditions effective at removing at least about 85 wt.% of the nitrogen compounds contained in said distillate boiling range feedstream thereby producing at least an comprising at least a distillate boiling range product stream and a used sulfuric acid solution, wherein the volumetric treat rate of the sulfuric acid solution is about 1 to about 10 vol.% to about, based on the distillate boiling range feedstream;
- c) separating said used sulfuric acid solution and said distillate boiling range product stream; and
- d) contacting said distillate boiling range product stream with an effective amount of an acid reducing material selected from caustic and water under conditions effective at reducing the total acid number of said distillate boiling range product stream; and
- e) hydrotreating said distillate boiling range product stream by contacting said distillate boiling range product with a hydrotreating catalyst containing at least one Group VI metal oxide and at least one Group VIII metal oxide under conditions effective at removing or converting at least a portion of the sulfur contained in said distillate boiling range product stream.

30. (New) The process according to claim 29 wherein the nitrogen present in said distillate boiling range feedstream includes carbazole and/or substituted carbazoles.

31. (New) The process according to claim 30 wherein said sulfuric acid solution contains about 85 to about 93 wt.% sulfuric acid.

32. (New) The process according to claim 29 wherein said sulfuric acid solution is obtained from an alkylation process unit wherein said alkylation process comprises:

- a) combining an olefinic hydrocarbon feedstream containing C₄ olefins with isobutane to form a hydrocarbonaceous mixture; and
- b) contacting the hydrocarbonaceous mixture with sulfuric acid under conditions effective for producing at least an alkylate and a sulfuric acid solution having an acid concentration of at least about 75 wt.%.

33. (New) The process according to claim 29 wherein water is added to said sulfuric acid solution to adjust the sulfuric acid concentration of said sulfuric acid solution.

34. (New) The process according to claim 33 wherein the sulfur concentration of the distillate boiling range product stream is about 0.1 to about 25 % wt.% less than the distillate boiling range feedstream.

35. (New) The process according to claim 34 wherein the yield loss attributed to the sulfuric acid solution treatment is about 0.5 to about 4 wt.%.

36. (New) The process according to claim 35 wherein the treat rate of the sulfuric acid solution is about 0.5 to about 20 vol.%.

37. (New) The process according to claim 36 wherein the nitrogen-containing distillate boiling range feedstream and the sulfuric acid solution are intimately contacted by a contacting method selected from non-dispersive and dispersive contacting methods.

38. (New) The process according to claim 37 wherein the non-dispersive contacting method is selected from packed inert particle beds and fiber film contactors.

39. (New) The process according to claim 37 wherein the dispersive contacting method is selected from mixing valves, static mixers and mixing tanks or vessels.

40. (New) The process according to claim 38 wherein the distillate boiling range product and the used sulfuric acid solution are separated by a separation device selected from settling tanks or drums, coalescers, electrostatic precipitators, and other similar devices.

41. (New) The process according to claim 40 wherein the distillate boiling range product and the used sulfuric acid solution are separated by fiber film contactors.

42. (New) The method according to claim 29 wherein said acid reducing material is water.

43. (New) The process according to claim 29 wherein the distillate feedstream is a non-hydrotreated distillate or a blend of non-hydrotreated distillates.

44. (New) The process according to claim 43 wherein the sulfuric acid solution has an acid concentration of greater than about 76 wt.%, a water concentration of about 2 wt.% to about 12 wt.%, and a dissolved oil concentration of less than about 12 wt.%.

45. (New) The process according to claim 29 wherein the distillate feedstream is a hydrotreated distillate, or a blend of hydrotreated distillates, each of which may or may not contain cracked stock.

46. (New) The process according to claim 45 wherein the sulfuric acid solution has an acid concentration of greater than about 79 wt.%, a water concentration of about 2 wt.% to about 9 wt.%, and a dissolved oil concentration of less than about 12 wt.%.

47. (New) The process according to claim 29 wherein the distillate feedstream is a non-hydrotreated distillate or a blend of hydrotreated distillates, containing greater than 10% cracked stock, based on the distillate or blend.

48. (New) The process according to claim 47 wherein the sulfuric acid solution has an acid concentration of greater than about 79 wt.%, a water concentration of about 2 wt.% to about 9 wt.%, and a dissolved oil concentration of less than about 12 wt.%.

49. (New) The method according to claim 29 wherein the distillate boiling range feedstream contains greater than 40 wt.% cracked stock.

50. (New) The process according to claim 49 wherein the sulfuric acid solution treat rate is about 2 vol.% to about 6 vol.% based on the distillate boiling range feedstream.